

MARITIME

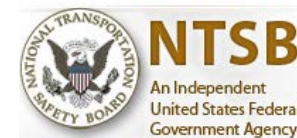
System Capabilities on Modern Cruise Ships

Power Generation and Essential Systems

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System Capabilities on Modern Cruise Ships

Regulations on System Design

- IMO Regulations
 - Safety of Life at Sea (SOLAS)
 - General Requirements on Systems
 - Safe Return to Port regulations
 - MSC Circulars (Guidelines and Interpretations)
- National Regulations
- Class Rules and Guidelines
 - Class Rules on System Design
 - Additional Class Notations (e.g. Redundant Propulsion)
 - Guidelines and Interpretations
- National and International Standards (e.g. DIN, ISO)
- Guidelines/Requirements of Owner Association (e.g. CLIA)

Safe Return to Port

- Why Safe Return to Port regulations?
 - Acknowledgment of the increase in size and number of persons on board as well as the related risk for persons, ship and the environment.
 - An incident on a large passenger ship may challenge SAR services.
 - The ship is its own best life boat ...
... to provide accommodation to passenger & crew whilst returning to a safe destination.



System Capabilities on Modern Cruise Ships

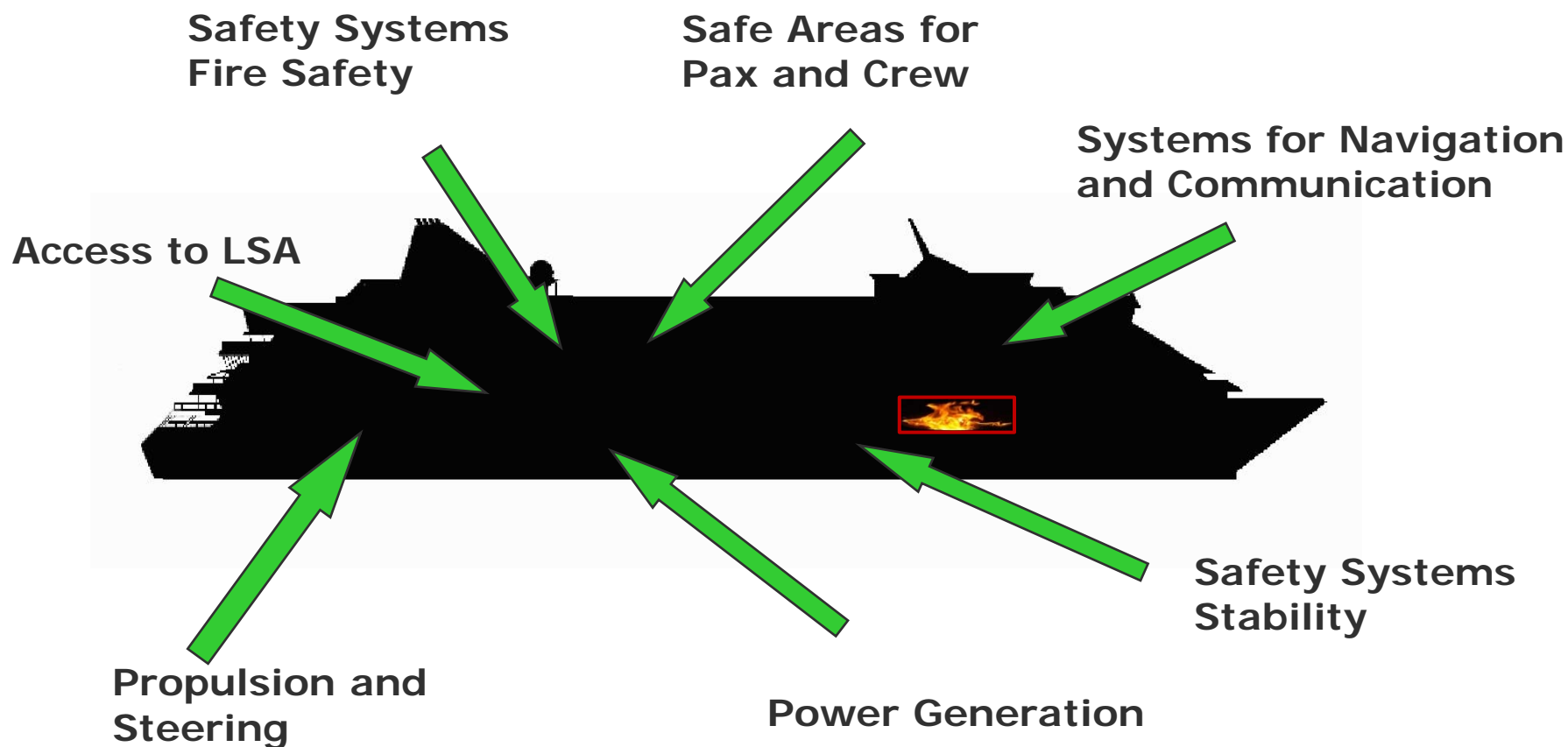
Safe Return to Port

Design requirement „Safe Return to Port“ means:

- Ships shall be capable of returning to port after a flooding or fire incident not exceeding a defined casualty threshold.
- During safe return to port operation the ship shall provide so-called 'safe areas' with basic services to ensure the health and safety of all persons on board.
- If a casualty case exceeds the predefined fire casualty threshold, orderly evacuation into the life saving appliances of the vessel shall be supported.
- Essential systems have to remain operational for at least three hours considering the loss of a whole main fire zone.
- Introduction of requirements for system capabilities of essential systems and functional requirements within safe areas after a casualty.

Safe Return to Port - Essential Systems and Functions

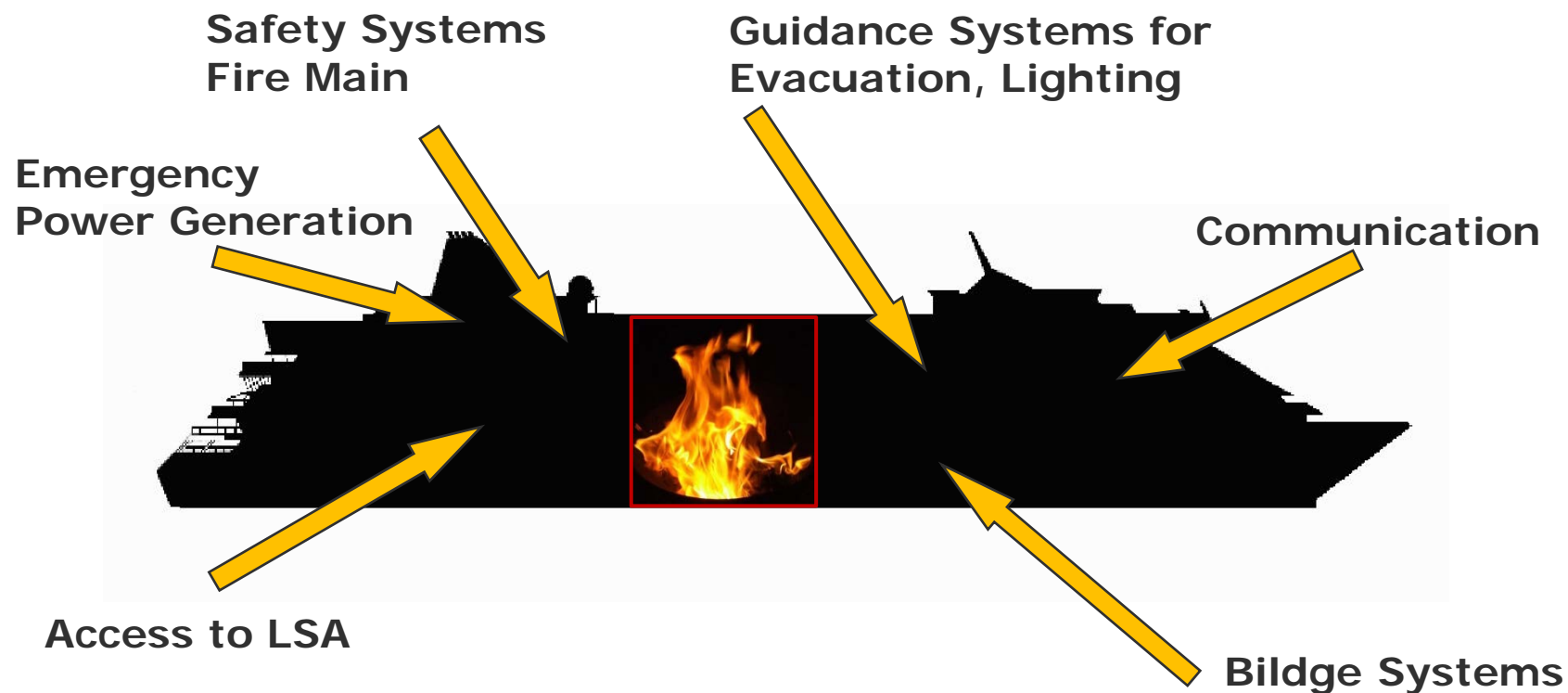
SOLAS II-2/21



System Capabilities on Modern Cruise Ships

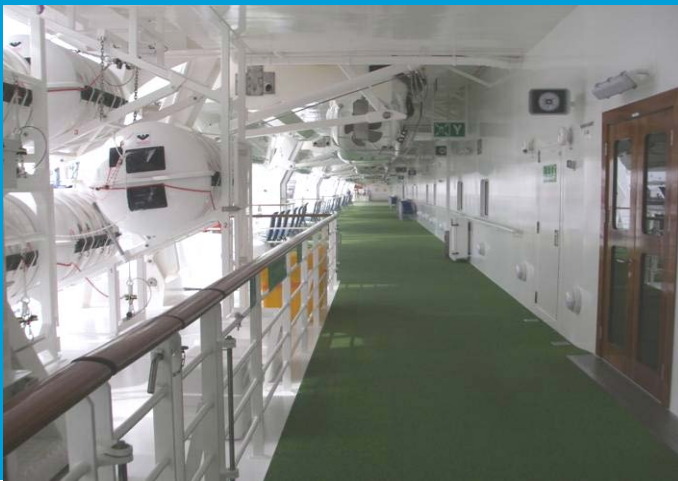
Safe Return to Port – Fire Damage to one MVZ

SOLAS II-2/22



Systems shall be capable of operation for at least 3 h.

Safe Return to Port – Minimum Requirements for Safe Areas



Minimum requirements as given by MSC.1/Circ. 1369
(DNV GL Proposal)

- Size of area (return time > 12 h) 2 m^2 / person
- Sanitation 1 toilette / 50 persons
- Water 3 l / person and day
- Food (8000 kJ / person and day)
- Alternate space for medical care
- Shelter from the weather
- Means of preventing heat stress and hypothermia $10^\circ\text{C} < \text{Temp} < 30^\circ\text{C}$
- Light (50 lux)
- Ventilation 4.5 m^3 / person and hour
- Access to LSA

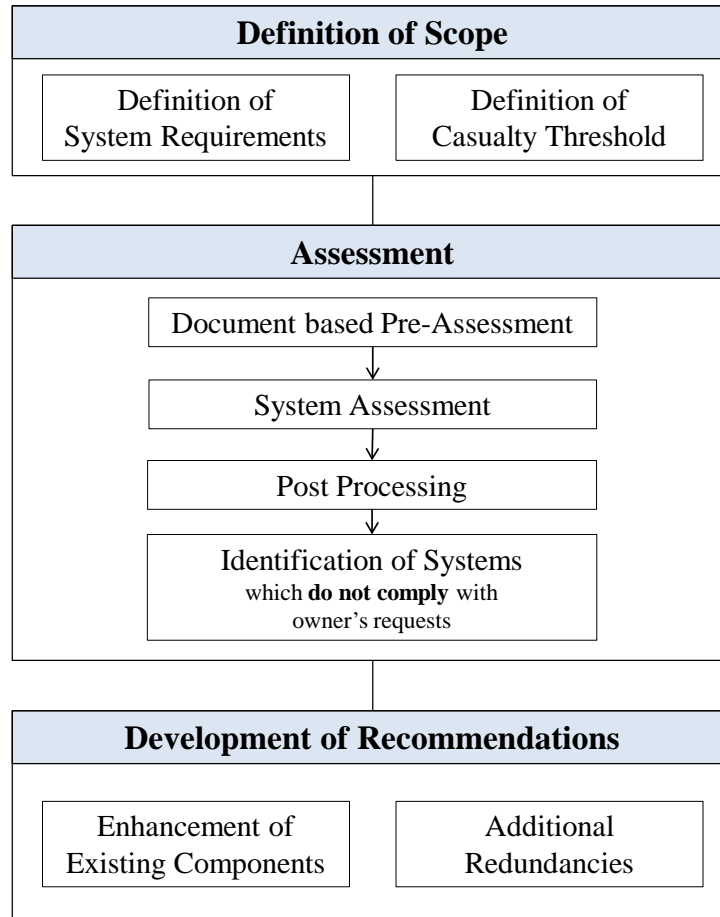
Just sufficient to survive, but still better than going into life rafts and boats!

Safe Return to Port – Benefits for Safety and Operation



- Systems will remain operational in case of
 - Local fire and flooding incidents,
 - Internal system failures (mechanical, electrical, ...)
- Journey may be finished without any affects on passengers and crew.
- In case of system failure SRtP capabilities might help to prevent collision and grounding.
- More efficient and flexible operation with additional system capabilities (e.g. manoeuvrability, speed, ...) and
- More reliable operation due to design benefits.
- Lower probability of loss of vessel.

System Vulnerability and Availability for Existing Cruise Ships



- For existing vessels no SOLAS regulation is addressing the system availability after a fire or flooding casualty.
- Redundant Propulsion Class Notations are considering only limited number of essential systems, mainly power generation and propulsion/steering capabilities, but no safety systems or services for Pax and Crew.
- To assess the system availability after possible casualty cases on existing vessels DNV GL has adapted its SRtP assessment methods.

System Vulnerability and Availability for Existing Cruise Ships

Objective of Assessment

1. Identification of systems not fulfilling the agreed set of requirements
2. Identification of incident scenarios affecting the systems (type and location/ arrangement)
3. System and/or operational based proposals to improve systems availabilities under consideration of predefined operational conditions
4. Proposals have to be balanced for reasonable and economical solutions (costs benefit analysis).

Identification
of System



Incident
Scenarios



Proposals



Cost Benefit
Analysis

System Vulnerability and Availability for Existing Cruise Ships



- System vulnerability and availability assessment for existing passenger ships can increase the safety and reliability significantly.
- It requires owners willingness to invest in safety and availability.
- SRtP principals and interpretations serves as sound basis for any assessment of existing vessels.
- The results may also be used to train the crew how to intervene in case of any fire or flooding incident.

Thank you for your attention!

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SAFER, SMARTER, GREENER

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